

The Examiner rejected Claim 16 under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and or use the invention. The Examiner further stated:

Claim 16 states that the holes in the glass are tapered. While it is understood that it is difficult to form a perfectly uniform hole and some tapering will invariably occur, if this is a claimed feature some means must be provided to form the structure, unless Applicant wishes to claim an artifact of the formation process. Correction is required.

This rejection is overcome because Applicant has canceled Claim 16. Furthermore, it appears that the rejection by the Examiner is based on personal knowledge of the Examiner, specifically, the statement "that it is understood that it is difficult to form a perfectly uniform hole [in glass] and some tapering will invariably occur...." In accordance with MPEP Section 1.107, which states:

When a rejection in an application is based on facts within the personal knowledge of an employee of the Office, the data shall be as specific as possible, and the reference must be supported, when called for by the applicant, by the affidavit of such employee, and such affidavit shall be subject to contradiction or explanation by the affidavits of the applicant and other persons.

Applicant requests that the Examiner support the above-identified statement in accordance with MPEP §1.107.

The Examiner rejected Claim 16 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner specifically stated:

A tapered hole is claimed but there is no discussion of what the taper is. Is it tapered in, tapered out or is it hourglass shaped? What is the degree of taper? What is the angle of the side of the via, is it close to a right angle or is it at a 45 degree angle? Corrections required.

This rejection is overcome because the Applicant has canceled Claim 16. However, it

show clearly whether the taper is in or out and that it is not hourglass shaped. In addition, it is not necessary to claim the degree of the taper unless it is necessary to distinguish over the prior art. It is also not necessary to claim the angle of the side of the via unless it is necessary to distinguish over the prior art.

The Examiner rejected Claims 4, 6, 7 and 15-17 under 35 U.S.C. §103(a) as being unpatentable over Lin in view of Tsukamoto and Igarashi et al. The Examiner specifically stated:

Lin shows a flip chip device (see Figure 5 and column 5, line 15) with a semiconductor chip 12 attached to an interposer board 22. Lin shows the interposer board attached to a PC board with layer of adhesive 36 but does not show a similar attachment between 12 and 22, noting that while it is standard practice (column 2, line 22) it prevents rework. Note that if rework is not as issue, bonding is recommended. Lin also teaches that the thermal coefficient of expansion of the interposer should match that of the die (column 6, line 28). Lin shows vias 24 in the plate 22 with evaporated traces 26 (column 6, line 64) on the plate which connects contacts 16 to vias 24 and solder beads 32 are formed on the surface of 22. Lin shows that the metallization 26 can be evaporated and if performed after forming the hole it will extend into the holes. In addition a conductive fill is used for the vias (column 6, line 66). Lin does not specify the material of the plate 1 but Tsukamoto shows a similar structure where the plate is a glass ceramic which will match the TCE of the die. Igarashi et al. show the use of polyimide to bond the die to the intermediate sheet.

The Examiner then concluded:

It would have been obvious to modify the device of Lin to include the glass ceramic plate taught by Tsukamoto to match the TCE of the die and plate and to use the polyimide bond taught by Igarashi et al. to have a known bonding material. With respect to claim 16, all techniques for forming holes in glass plates will produce some tapering, especially if a liquid etch is used and tapering will be an inherent feature of hole formation.

This rejection is overcome first, because the structure of the present invention is formed on a SEMICONDUCTOR WAFER. The structures of the cited references are flip-

chips, which are completely different than the structures of the present invention. The structure of the present invention comprises in accordance with Claim 15:

- a semiconductor wafer with a pattern of bond pads on a surface of the semiconductor wafer, wherein the bond pads can be formed anywhere on the surface of the semiconductor wafer;

- a glass sheet with holes in a pattern matching the pattern of bond pads on the surface of the semiconductor wafer;

- a layer of adhesive adhering the glass sheet to the semiconductor wafer, wherein the holes in the glass sheet are over the bond pads on the surface of the semiconductor wafer;

- metallized pads formed on the glass sheet adjacent to each hole in the glass sheet; and

- a conductive trace connecting each of the metallized pads to a corresponding bond pad on the surface of the semiconductor wafer. [emphasis added]

A person of ordinary skill in the art would immediately recognize the difference between the present invention and the references cited by the Examiner. In order to form the structures in the prior art assuming that a semiconductor wafer produces 500 chips, it would take 500 separate steps for each of the processes described in any of the references whereas in the present invention, it would only take one step for each of the processes described in the present invention. THERE SEEMS TO BE A MAJOR DIFFERENCE BETWEEN THE PRESENT INVENTION AND THE PRIOR ART REFERENCES, WHICH IS NOT DISCLOSED, TAUGHT OR SUGGESTED IN ANY OF THE REFERENCES.

Because the structure of the present invention is not disclosed, taught or suggested in any of the references, the Examiner is assumed to have made the conclusion concerning obviousness based upon personal knowledge.

Applicant therefore requests that the Examiner support the above-identified conclusion of obviousness in accordance with MPEP §1.107.

The references taken individually or in any combination do not disclose, teach, or

that the rejection under 35 U.S.C. §103(a) is overcome because the Examiner has not identified a basis for the conclusion that "it would have been obvious to modify the device of Lin to include the glass ceramic plate taught by Tsukamoto to match the TCE of the die and plate and to use the polyimide bond taught by Igarashi et al. to have a known bonding material." The opinion of the Examiner as to what would have been obvious at the time the invention was made is irrelevant and meaningless. The statutory standard for obviousness is what would have been obvious to a person of ordinary skill in the art at the time the invention was made. Would the Examiner establish his/her credentials as a person of ordinary skill in the art, that is, how many years the Examiner has worked in the semiconductor packaging art and any other pertinent information? The Examiner must have some basis for the conclusion other than a mere opinion. The Examiner's obviousness rejection based upon the combination of references is improper because the Examiner has not pointed out where in the references there is a reason, suggestion or motivation in the prior art whereby a person of ordinary skill in the field of the invention would make the combination. In fact, the cited prior art teaches away from the combination as disclosed and claimed in the present application. In addition, the references, taken in any combination, do not show the combination as disclosed and claimed by the present invention. Therefore, it is impossible for the Examiner to conclude that it would have been obvious to combine the references.

The PTO has the burden under §103 to establish a *prima facie* case of obviousness. In re Piasecki, 745 F.2d 1468 (Fed. Cir. 1984). The *prima facie* case of obviousness can only be satisfied by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. In re Fine, 837 F.2d 1071.

The Examiner, in the Response to Arguments referred to Applicant's statement that the Examiner's opinion [concerning obviousness] is irrelevant and meaningless with the question as to whether the examination be performed by someone other than the Examiner

and if so, who? In addition, the Examiner stated the until someone else is identified, "it is the Examiner who forms conclusions about obviousness."

Applicant takes exception to the Examiner's misdirected opinion that "it is the Examiner who forms conclusions about obviousness." The last I heard, the conclusion of obviousness includes a consideration of the factors delineated in *Graham v. John Deere*. Would the Examiner please disclose to the Applicant all of the factors considered by the Examiner when he/she made the conclusion re obviousness. The Applicant submits that the Examiner is not qualified to form a conclusion about obviousness. The only function of the Examiner is to present a *prima facie* case of obviousness. In re Piasecki, 745 F. 2d 1468 (Fed.Cir.1984). The Federal Circuit has endorsed the concept of the *prima facie* case of obviousness in *In re Oetiker*, 997 F.2d 1443, stating that "[i]f the examination at the initial stage does not produce a prima facie case of unpatentability, then without more the applicant is entitled to grant of the patent."

Apparently the Examiner is not familiar with the elements of the *prima facie* based on the Federal Circuit and CCPA interpretations of *prima facie* obviousness. The CCPA in *In re Lintner*, 458 F.2d 1013, stated:

In determining the propriety of the Patent Office case for obviousness in the first instance, it is necessary to ascertain whether or not the reference teachings would appear to be sufficient for one of ordinary skill in the relevant art having the references before him to make the proposed substitution, combination or other modification.

The CCPA has subsequently added that the *prima facie* case requires that the reference teachings "appear to have suggested the *claimed subject matter*. *In re Rinehart*, 531 F.2d 1048. **THUS, THE EXAMINER MUST EXPLAIN WHY THE PRIOR ART WOULD APPEAR TO SHOW THE CLAIMED SUBJECT MATTER AND NOT SIMPLY THE GENERAL ASPECTS OF THE INVENTION.** The Examiner has not done this. Nowhere is it suggested that the structure in the cited references be formed on a semiconductor wafer

1. one or more references
2. that were available to the inventor and
3. that teach
4. a suggestion to combine or modify the references,
5. the combination or modification of which would appear to be sufficient to have made the claimed invention obvious to one of ordinary skill in the art.

As discussed above, NONE OF THE REFERENCES CITED BY THE EXAMINER TEACH A SUGGESTION TO COMBINE OR MODIFY THE REFERENCES. In fact, none of the references disclose, teach or suggest the structure of the claimed invention, specifically, the structure being formed on a semiconductor wafer. The question remains

chip that is diced from a semiconductor wafer and as discussed above, if there are 500 chips diced from a semiconductor wafer, each task must be performed once for each chip, that is, 500 times. In the case of a semiconductor having 500 chips and 5 processes to complete a "flip-chip" package, the present invention would replace 2500 process steps with 5 or less. This is a major accomplishment in the semiconductor industry and for anyone to "conclude that it is obvious" from the cited prior art is ludicrous. Such a method to replace this many steps in the packaging of semiconductor die has been long-sought and the Applicant is the first to provide such a method and structure. That is why the Examiner could not cite any references showing a structure formed on a semiconductor wafer.

The Applicant was the first to provide a structure in which the tasks only have to be performed once on the semiconductor wafer. The claimed invention has not been disclosed, taught or suggested in any of the references cited by the Examiner singularly or in any combination.

In addition, as discussed above, the function of the Examiner is not to "make conclusions re obviousness" but to establish a *prima facie* case of obviousness by pointing out prior art references "that teach a suggestion to combine or modify the references..." Since none of the references cited by the Examiner "teach a suggestion to combine or modify the references" a *prima facie* case of obviousness has not been established

As discussed above, obviousness is tested by "what the combined teachings of the references would have suggested to those of ordinary skill in the art." In *re Keller*, 642 F.2d 413. But it "cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. [emphasis added] *ACS Hosp. Sys. [Inc. v Monefiore Hosp.]*, 732 F.2d 1572. And the "teachings of references can be combined *only* if there is some suggestion or incentive to do so." *Id.*

Because none of the references cited by the Examiner disclose the combination disclosed and claimed by the present invention, the Examiner, as discussed above, must point out where in the cited prior art, there is a suggestion to make the combination. The Federal Circuit, in In re Paulsen, 30 F.3d 1475 (1974) stated that "we have been guided by the well-suited principles that the claimed invention must be considered as a whole, multiple cited prior art references must suggest the desirability of being combined, and the references must be viewed without the benefit of hindsight afforded by the disclosure." In addition, the Federal Circuit, in Texas Instruments Inc. v. U.S. Int'l Trade Comm'n, 988 F.2d 1165 stated "Absent such suggestion to combine the references, respondents can do no more than piece the invention together using the patented invention as a template. Such hindsight reasoning is impermissible. The Examiner has not pointed out where in the cited prior art there is a suggestion to form the structures on a semiconductor wafer. Because the Examiner has not done so, the Examiner's "conclusion" is faulty.

The present invention discloses and claims a glass plate with holes that correspond 1-to-1 with metal pads on a semiconductor wafer to which the glass plate is adhered, the glass plate has metal pads adjacent to each hole and solder bumps are formed on the metal pads on the glass plate. None of the cited references disclose, teach, or suggest this combination. The Examiner has concluded, without any basis in fact, "It would have been obvious to modify the device of Lin to include the glass ceramic plate taught by Tsukamoto to match the TCE of the die and plate and to use the polyimide bond taught by Igarashi et al. to have a known bonding material." The Federal Circuit, in In re Gordon, 733 F.2d 900 stated that in regards to a reference being modified "The mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification." In addition, this conclusion is meaningless because none of the structure in the prior art is being formed on a semiconductor wafer.

In view of the clear guidelines provide by the Federal Circuit and its predecessor, the

to establish a *prima facie* case of obviousness and the application must therefore be passed to issue.

Respectfully submitted,

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Docket No.

Applicant(s): **Donald Malcolm MacIntyre****MAI1003**

Serial No.

09/045,507

Filing Date

3/20/98

Examiner

D. Wille

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